

*ERL 2015 WG 3: Instrumentation,
Controls, Beam Loss, Halo
Management*

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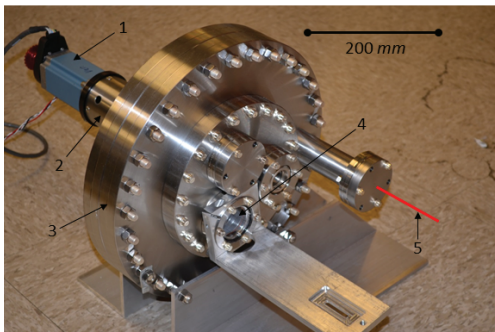
WG 3 Charge:

Explore recent developments and experience with beam instrumentation, controls designed for/used in ERLs, as well as the effects of and relevant diagnostics for beam loss and halo management

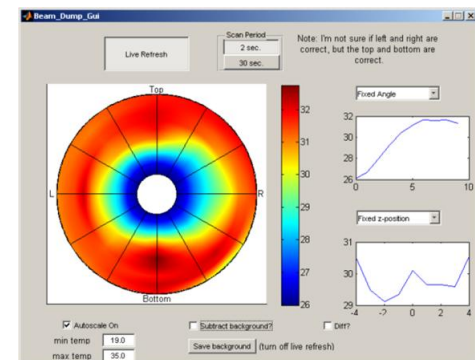
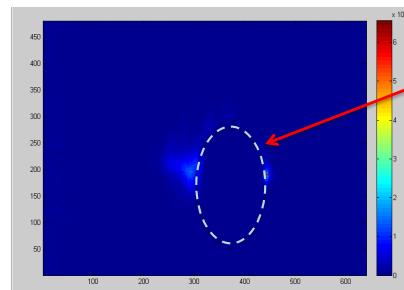
- Considering instrumentation for (Injector + Recirculation) X (Commissioning + Operation), have a very large dynamic range of beam parameters:
 - Bunch charge fC – nC (10^6)
 - Current μA – 0.1 A (10^5)
 - Energy 10 MeV – 20 GeV (10^3)
- Multiple beams
- High beam power -> limits the use of interceptive diagnostics
- High beam power -> small relative losses -> large absolute losses from EPS/PPS standpoint

List of topics:

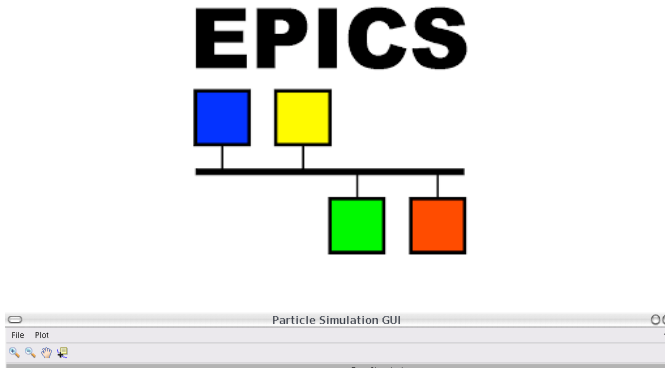
- Transverse beam profile measurement
- Beam orbit measurement
- Longitudinal beam diagnostics (bunch length, energy spread)
- Orbit Stabilization and feedback
- Beam Halo measurement / mitigation
- Dark current measurement / mitigation
- Beam Loss Detection
- Machine Interlocks:
 - Requirements, Speed, Calibration, Stability (Reliability), etc
 - Precise timing systems / Synchronization



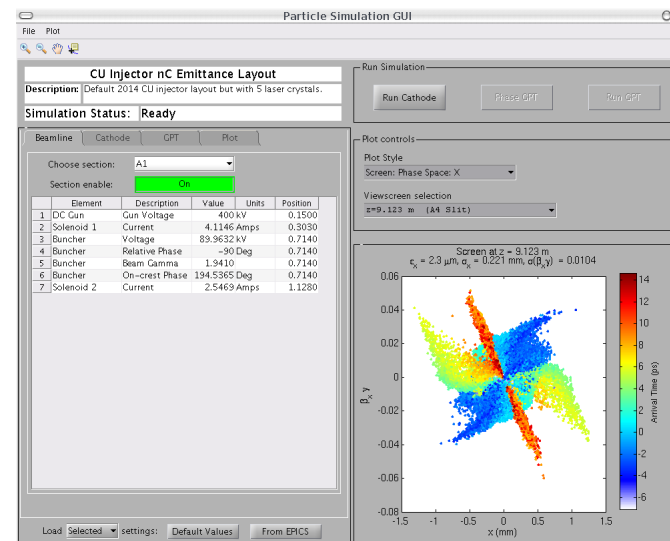
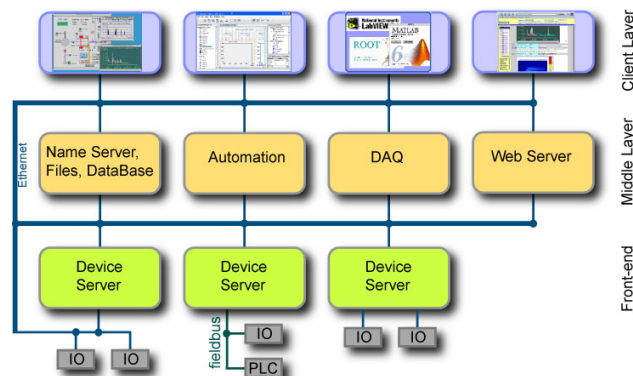
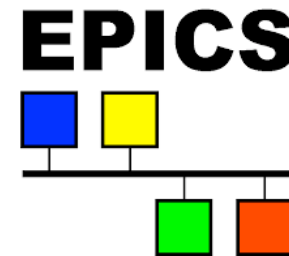
A viewer with a hole for imaging halo



- Software framework (EPICS, DOOCS, etc)
- Machine modeling tools and migration between software frameworks
- Software development
- Archive / Retrieval
- Alarm systems



The EPICS logo is displayed, consisting of the word "EPICS" in bold black letters above a horizontal bar with four colored squares (blue, yellow, green, orange) hanging from it. Below the logo is a screenshot of a software window titled "Particle Simulation GUI". The window has a menu bar with "File" and "Plot" options, and a toolbar with icons for file operations and simulation control.



Instrumentation, Controls, Beam Losses:

Wednesday Morning Session: 9:00 – 10:30, Lecture Hall 2

- 9:00: “Non-destructive Beam Position Monitoring in the Two-Beam Section of an ERL” (20 mins),
Speaker: Takashi Obina (KEK)
- 9:20: “Beam Current Monitoring with ICT and BPM Electronics” (20 mins),
Speaker: Igor Pinayev (BNL)
- 9:40: “Fast Electron Beam and FEL Diagnostics in the ALICE IR-FEL at Daresbury Laboratory” (20 mins),
Speaker: Frank Jackson (STFC Daresbury)
- 10:00: “Current Measurement and Associated Machine Protection in ERL at BNL” (20 mins),
Speaker: Toby Miller (BNL)

Discussion (10 mins)

RF Controls (WG3 + WG4):

Wednesday Afternoon Session: 15:55 – 17:35, Lecture Hall 2

15:55: “Performance of the Digital LLRF Systems for cERL at KEK” (25 mins)

Speaker: Feng Qiu (KEK)

16:20: “Resonance Control for Narrow-Bandwidth, Superconducting Accelerator Applications” (25 mins)

Speaker: J. P. Holzbauer (Fermilab)

16:45: “Using A 1.3 GHz 20kW Solid State Amplifier As RF Power Supply For DC-SRF Photo-injector” (25 mins)

Speaker: Fang Wang (Peking University)

17:10: Discussion (25 mins)

Instrumentation, Controls, Beam Losses Day 2 (WG1 + WG3) :

Thursday: 9:00 – 10:30, Lecture Hall 2

9:00: Diagnostic Test-Beam-Line for the MESA Injector (25 mins)

Speaker: I. Alexander (Institute for Nuclear Physics – Mainz U.)

9:25: A Fast Rotating Wire Scanner for Use in High Intensity Accelerators (25 mins)

Speaker: S. Full (Cornell University)

9:45: “Detection and Clearing of Trapped Ions in the High Current Cornell Photoinjector” (25 mins)

Speaker: S. Full (Cornell University)

10:15: “GaAs Photocathode R&D: Energy Spread Measurements and the Nature of the Activated p-GaAs(Cs,O) Activation Layer (15 mins)

Speaker: Lee Jones (STFC/DL/ASTeC)